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To Whom It May Concern:

This is to certify that a professional translator on our staff who is skilled in the German language translated the enclosed WO2005007276A and Amended Claims from German into English.

We certify that the attached English translation conforms essentially to the original German language.

Kim Vitray
Operations Manager

Subscribed and sworn to before me this 22nd day of December, 2005.

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Amended Claims

Claims

1. A method for producing a filter element that includes the following successive steps:

S1) application of a membrane layer to a carrier substrate,

S2) etching a membrane chamber on the side of the carrier substrate opposite to the membrane layer, so that a residual layer of the carrier substrate still remains,

S3) generation of pores in the membrane layer by means of a lithographic and etching process in order to create a perforated membrane,

S4) removal of the residual layer of the membrane chamber by etching in order to expose the membrane layer of the membrane chamber,

S5) where the membrane layer is subjected, during step S1 or in a later step, to an additional treatment in order to increase its mechanical strength, which consists of the following:

S51) formation of crystal nuclei in the membrane layer in step S1 and/or

S52) temperature treatment of a structure of carrier layer and membrane layer (in particular heating) in order to increase the crystalline fraction in the membrane layer in step S1 and/or S5; and/or

S53) isostatic hot pressing of the structure of carrier layer and membrane layer to increase the crystalline fraction in the membrane layer in step S5; and/or

S54) generation of an internal prestress in the membrane layer in Step S1 or S5.

2. A method as in Claim 1, which is characterized by the fact that the treated membrane layer has a crystalline fraction of at least 25%.

3. A method as in Claim 1, which is characterized by the fact that a membrane layer is applied to a carrier substrate by means of a chemical vapor deposition process (CVD process).

4. A method as in Claim 1, which is characterized by the fact that a membrane layer is applied to a carrier substrate by means of a physical vapor deposition process (PVD process).

5. A method as in one of the preceding claims, which is characterized by the fact that the membrane layer consists of a ceramic material.

6. A method as in Claim 5, which is characterized by the fact that the membrane layer consists of a non-oxide ceramic.

7. A method as in Claim 6, which is characterized by the fact that the membrane layer consists of a nitride non-oxide ceramic.

8. A method as in Claim 7, which is characterized by the fact that the membrane layer consists of $Si_3N_4$.

9. A method as in Claim 6, which is characterized by the fact that the membrane layer consists of a carbide non-oxide ceramic.

10. A method as in Claim 9, which is characterized by the fact that the membrane layer consists of SiC.

11. A method as in Claim 1, which is characterized by the fact that the temperature treatment is carried by holding the membrane layer in a temperature range of about 200°C to 2000°C at a process pressure of about 5 Pa – 100 Pa.

12. As in Claim 1, which is characterized by the fact that the temperature treatment step is a sintering at temperatures over about 900°C.

13. As in Claim 1, which is characterized by the fact that the temperature treatment is carried out by means of electromagnetic radiation in the radiowave or microwave range.

14. A method as in Claim 13, which is characterized by the fact that the microwave radiation lies in the frequency range above 25 GHz, preferably in a frequency range at which the material of the membrane layer has a peak in its absorption curve.

15. A method as in Claim 1, which is characterized by the fact that the isostatic hot pressing is carried out at temperatures above about 750°C and pressures above about 100 bar.

16. A method as in Claim 1 and/or Claim 15, which is characterized by the fact that the isostatic hot pressing step is carried out prior to step S3 as in Claim 1.

17. A method as in Claim 1, which is characterized by the fact that the membrane layer is protected against etching agents after step S3 as in Claim 1.

18. A method as in Claim 17, which is characterized by the fact that the membrane is protected by a solid masking.

19. A method as in Claim 17, which is characterized by the fact that the membrane layer is protected by a coating material that is again removed after step S4 of Claim 1.

20. A filter element with a membrane layer (1) and a carrier layer (2), where the membrane layer (1) has a plurality of perforations (6), which is characterized by the fact that in the carrier layer (2) a membrane chamber (3) is exposed, the membrane layer (1) spans over the membrane chamber (3) and the membrane layer (1) has a compacted and/or at least partially crystalline structure with strength that has been increased over that of the starting material.

21. A filter element as in Claim 20, which is characterized by the fact that the increased strength of the membrane layer (1) is produced through an internal mechanical prestress.

22. A filter element as in Claim 20, which is characterized by the fact that the membrane layer (1) has microcrystalline and/or nanocrystalline structures and/or has been compacted.

23. A filter element as in one of Claims 20-22, which is characterized by the fact that the carrier substrate (2) has a plurality of membrane chambers (3), each of which is spanned over by one and the same membrane layer (1).

24. A filter element as in one of Claims 20-23, which is characterized by the fact that the membrane chamber (3) is rectangular in plan view.

25. A filter element as in Claim 24, which is characterized by the fact that the membrane chamber (3) in plan view has the shape of a slot, whose length is at least twice its width.

26. A filter element as in one of Claims 20-25, which is characterized by the fact that two oppositely lying sides (4) of the membrane chamber (3) run at an angle of less than 90° to the plane of the membrane.

27. A filter element as in one of Claims 20-26, which is characterized by the fact that the pore ratio of the thickness D of the membrane and pore diameter P the following relationship is valid: $0.01 < D/P < 100$, where the following applies for the thickness D of the membrane: $0.01\ \mu m < D < 100\ \mu m$.

28. A filter element as in one of Claims 20-27, which is characterized by the fact that the pores are essentially circular in shape and have a diameter in the range between 0.01 μm and 100 μm.

29. A filter element as in one of Claims 20-28, which is characterized by the fact that the membrane layer (1), on the side turned toward the membrane chamber (3), lies on at least one intermediate support (8), the thickness of which is less than the thickness of the carrier substrate.

30. A filter element as in one of Claims 20-29, which is characterized by the fact that the membrane chamber (3) essentially extends over the entire area of the filter element.

31. A filter element as in one of Claims 20-30, which is characterized by the fact that the carrier substrate is chosen from the group of the following substances: Si, SiC, titanium oxides and other titanium compounds, magnesium oxide, zirconium oxide, nickel, chromium, Ni-chromium compounds, $Al_2O_3$, yttrium compounds, and that the membrane layer consists of $Si_3N_4$, SiC, a combination of the two substances or another silicon ceramic.